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*Indian Standard*

# GUIDE FOR PREPARATION OF DIAGRAMS, CHARTS AND TABLES FOR ELECTROTECHNOLOGY

## PART II ITEM DESIGNATION

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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# *Indian Standard*

# GUIDE FOR PREPARATION OF DIAGRAMS, CHARTS AND TABLES FOR ELECTROTECHNOLOGY

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# GUIDE FOR PREPARATION OF DIAGRAMS, CHARTS AND TABLES FOR ELECTROTECHNOLOGY

## PART II ITEM DESIGNATION

## 0. FOREWORD

**0.1** This Indian Standard ( Part II ) was adopted by the Indian Standards Institution on 14 December 1976, after the draft finalized by the Electrotechnical Standards Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** A number of standards have been published on graphical symbols for use on diagrams in the field of electrotechnology ( *see* various parts of IS : 2032* ). After having covered most of the needs for graphical symbols, with the exception of those for new fields of electrotechnology still under consideration, it has been found advisable to supplement the Indian Standard on graphical symbols publications with standards for the preparation of diagrams.

**0.3** This standard will include definitions and classification of diagrams, charts and tables; guiding principles for use and combination of graphical symbols; guiding principles for preparation of diagrams; guiding principles for supplementing or replacing diagrams by charts and tables; item designation; etc.

**0.4** This standard is being brought out in five parts as follows:

Part I Definitions and classification

Part II Item designation

Part III General requirements for diagrams

Part IV Circuit diagrams

Part V Interconnection diagrams and tables

**0.5** This standard has been prepared to lay down rules for the unambiguous formation and application of discrete item designations for electrical parts and equipment.

*Graphical symbols used in electrotechnology.

**0.6** While preparing this standard, assistance has been derived from IEC Pub 113-2 ( 1971 ) 'Diagrams, charts, tables. Part 2: Item designation', issued by the International Electrotechnical Commission.

## 1. SCOPE

**1.1** This standard ( Part II ) covers rules for the unambiguous formation and application of discrete item designations for electrical parts and equipment.

**1.2** The designation is shown at an appropriate place near the graphical symbol of the item. The designation correlates the item on different diagrams, parts lists, circuit descriptions, instructions and in the equipment. For maintenance purposes, the designation or part of it may also be shown on or near the item on the equipment.

## 2. DEFINITIONS

**2.0** For the purpose of this standard, the following definitions shall apply.

**2.1 Designation** — A distinctive code, which serve to identify an item in a diagram, list, chart and on the equipment.

**2.2 Diagram** — A diagram may show the manner in which the various parts of a network, installation, group of apparatus or items of an apparatus are interrelated and/or interconnected.

**2.3 Chart** — A chart may show the interrelation between:

a) different operations,

b) operations and time,

c) operations and physical quantities, and

d) the state of several items.

**2.4 Table** — A table replaces or supplements a diagram or a chart.

**2.5 Block of Designation** — Related information is grouped in a single designation block. The type and amount of information given by a designation will depend on the type of diagram.

**2.6 Item** — Used for component, equipment, plant, unit, etc, which is represented by a graphical symbol on a diagram.

**2.7 Kind of Item** — The code for the kind of item is derived from sort, variety, class or group of items regardless of their function in a circuit.

**2.8 Function** — Characteristic action or purpose of an item in relation to others. The designation of the function may be rather general, for example, a relay may have an auxiliary function ( auxiliary relay ). The designation of the function may also be more specific, for example, a motor may have the function of driving a pump of the cooling system of a generator.

**2.9 Number** — A number should be assigned to each item in an unambiguous manner. The numbers need not necessarily be in an uninterrupted sequence. Groups of numbers may be assigned to groups of items, if desired.

**2.10 Location** — The physical position of an item in a subassembly, unit, plant, etc. The location designation may be essential to identify the item, for example, for maintenance.

**2.11 Higher-Level Assignment** — A supplementary designation may be assigned to an item, if it is desired to express its relation to a larger unit of a system, of which it is a part. The designation may be derived from the kind, purpose or location of the larger unit.

**2.12 Qualifying Symbols** — For example, hyphen, colon, etc, are used to identify the various designation blocks.

## 3. DIFFERENT TYPES OF DESIGNATION

**3.1** An item designation may be used for general or special purposes depending on the kind of information required. The different types of designation dealt with in this standard provide information for the following purposes:

a) Higher-level assignment showing correlation with other parts of the equipment with regard to location and/or function;

b) Location of item;

c) Identification of item:

A = kind of item,

B = number of item, and

C = function of item;

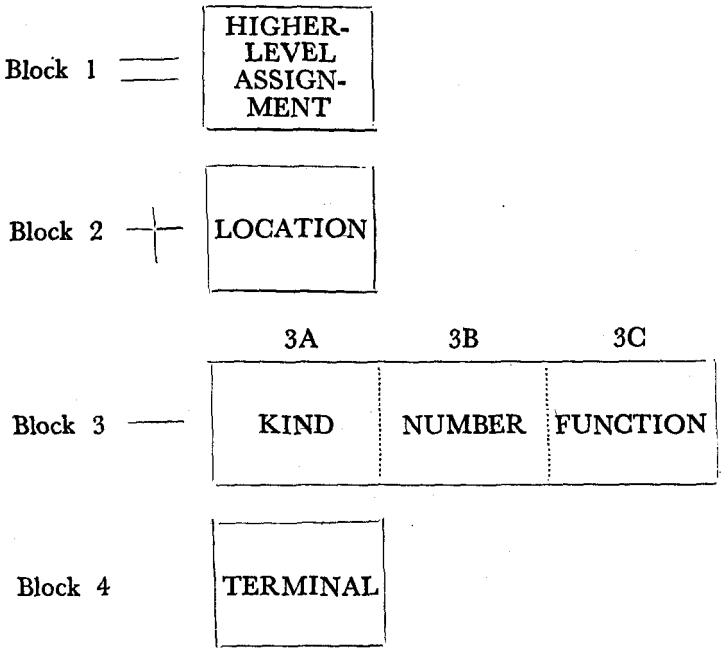
d) Terminal and conductor marking.

On most diagrams an appropriate portion of the item designation ( for the purposes listed above ) is sufficient. The selection of the portion used depends on the type of diagram.

## 4. ARRANGEMENT OF ITEM DESIGNATION

**4.1** The kind, number and function of an item, and sometimes its higher-level assignment, are known at an early stage of the design and development of the equipment. Therefore, these portions of the designation may be used on sketches and diagrams.

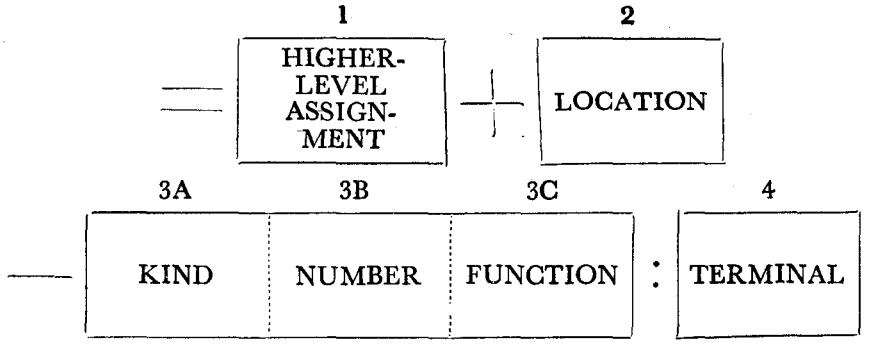
**4.1.1** Qualifying symbols are used to distinguish the various Blocks 1, 2, 3 and 4 of a complete designation. The different blocks with their qualifying symbols are shown below:




**4.1.2** If qualifying symbols other than those shown above are used, they should be explained.

**4.1.3** The qualifying symbol may be omitted or replaced by a note on the diagram if there is no ambiguity. Where the designations appear in lists ( for example, connection tables, parts lists ) the columns of the list may be so arranged that the qualifying symbols may be omitted.

4.1.4 The following sequence of designation blocks is preferred:




4.1.5 Where there is a lack of space on the diagram or when only some of the designation blocks are required, their sequence or presentation may be varied.

4.1.6 It is recommended that the same sequence be used for all designations in a particular set of diagrams.

4.2 In this standard, the designations consist of Latin letters and Arabic numbers. Their mutual arrangement is defined in 5

4.2.1 To make possible the use of automatic data processing and to simplify the use of designations for preparation of lists, wiring instructions, etc, lower case and upper case letters should have the same meaning. Where this is not possible ( for example, for terminal designations ), means shall be provided to make the distinction.

## 5. DESIGNATION GROUPS

**5.1 Initial Remarks** — The variety of elements and equipment in electrotechnology and their rapid development make it impracticable to establish all necessary designations in a standard.

5.1.1 By grouping several related items, however, it has been possible to create recommended lists of designations ( *see* Tables 1 and 2 ). For cases where these lists are not applicable, this standard provides general rules for the establishment of the designations in each of the blocks defined in 4. The meaning of designations built up according to these rules shall be explained or referenced on the diagram or explained in supporting documentation.

5.1.2 As designations consist of letters and/or numbers, it has been necessary in certain cases to give mandatory rules for the sequence of letters and numbers. In the following rules, A stands for letter(s) and N stands for number(s).

**5.1.3** In **4.1** and **4.1.1** a preferred sequence of the four blocks of designation is recommended. However, in the following the blocks are dealt with in their order of importance.

**TABLE 1 LETTER CODES FOR THE DESIGNATION OF KIND OF ITEM ( COMPLYING TO BLOCK 3A )**

( *Clause* 5.1.1 *and* 5.2.1.2 )

| LETTER CODE | KIND OF ITEM | EXAMPLES |
|---|---|---|
| A | Assemblies, subassemblies | Amplifier with tubes or transistors, magnetic amplifier, laser, maser |
| B | Transducers, from non-electrical quantity to electrical quantity or vice-versa | Thermo-electric sensor, thermo cell, photo-electric cell, dynamometer, crystal transducer, microphone, pick-up, loudspeaker, synchros, resolvers |
| C | Capacitors | |
| D | Binary elements, delay devices, storage devices | Combinative elements, delay lines, bistable elements, monostable elements, core storage, register, magnetic tape recorder, disk recorder |
| E | Miscellaneous | Lighting devices, heating devices, devices not specified elsewhere in this table |
| F | Protective devices | Fuse, over-voltage discharge device, arrester |
| G | Generators, supplies | Rotating generator, rotating frequency converter, battery, supply device, oscillator, quartz-oscillator |
| H | Signalling devices | Optical and acoustical indicators |
| J | | |
| K | Relays, contactors | |
| L | Inductors | Induction coil, line trap |
| M | Motors | |
| N | | |
| P | Measuring equipment, testing equipment | Indicating, recording and integrating measuring devices, signal generator, clocks |
| Q | Mechanical switching devices for power circuits | Circuit-breaker, isolator |
| R | Resistors | Adjustable resistor, potentiometer, rheostat, shunt, thermistor |
| S | Switches, selectors | Control switch, push-buttons, limit switch, selector switch, selector, dial contact, connecting stage |
| T | Transformers | Voltage transformer, current transformer |
| U | Modulators, changers | Discriminator, demodulator, frequency changer, coder, inverter, converter, telegraph translator |

( *Continued* )

**TABLE 1 LETTER CODES FOR THE DESIGNATION OF KIND OF ITEM ( COMPLYING TO BLOCK 3A ) — *Contd***

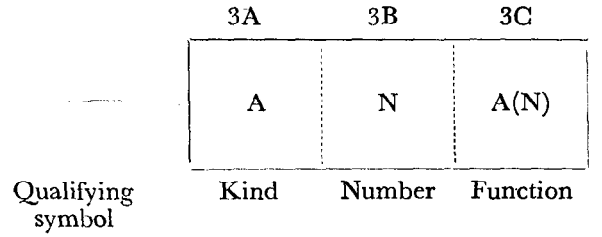
| Letter Code | Kind of Item | Examples |
|---|---|---|
| V | Tubes, semiconductors | Electronic tube, gas-discharge tube, diode, transistor, thyristor |
| W | Transmission paths, waveguides, aerials | Jumper wire, cable, busbar, waveguide, waveguide directional coupler, dipole, parabolic aerial |
| X | Terminals, plugs, sockets | Disconnecting plug and socket, test jack, terminal board, soldering terminal strip |
| Y | Electrically operated mechanical devices | Brake, clutch, pneumatic valve |
| Z | Terminations, hybrid transformers, filters, equalizers, limiters | Cable balancing network, compandor, crystal filter |

**TABLE 2 LETTER CODES FOR THE DESIGNATION OF GENERAL FUNCTION ( COMPLYING TO BLOCK 3C )**

( *Clauses* 5.1.1 *and* 5.2.3.2 )

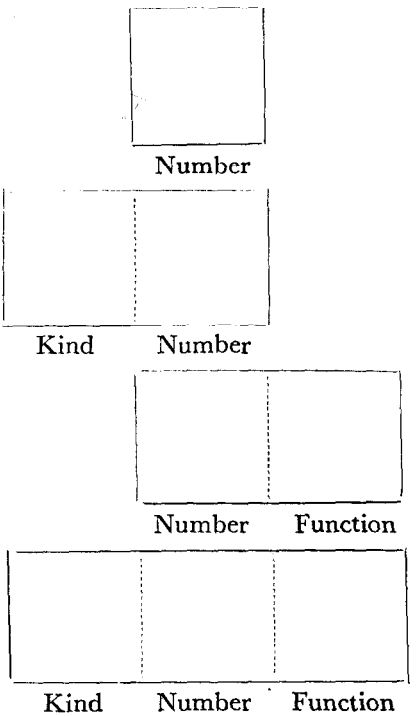
| Letter Code | General Function |
|---|---|
| A | Auxiliary |
| B | Direction of movement ( forward, backward, hoist, lower, clockwise, anti-clockwise ) |
| C | Counting |
| D | Differentiating |
| E | |
| F | Protecting |
| G | Testing |
| H | Signalling |
| J | Integrating |
| K | Jog |
| L | |
| M | Main |
| N | Measuring |
| P | Proportional |
| Q | State ( start, stop, limit ) |
| R | Reset, erase |
| S | Storing, recording |
| T | Timing, delaying |
| U | |
| V | Speed ( accelerating, braking ) |
| W | Adding |
| X | Multiplying |
| Y | Analogue |
| Z | Digital |

**5.2 Identification and Function of Item** — It is illustrated below:




This block consists of three parts ( 3A, 3B and 3C ). Part 3B is mandatory. Parts 3A or 3C or both may supplement 3B.

The following are possible combinations:




**5.2.1** Part 3A gives information about the kind of item or element. This should consist of one or more letters, preferably one.

**5.2.1.1** Letters for designating the kind of item are often derived mnemonically from a language. For international use, however, it is useful to have a fixed list of letters. Because the graphical symbol on a diagram

provides additional information, it is possible to allot a single letter to each group of items.

**5.2.1.2** The recommended list of kind of item code letters is shown in Table 1. If another list is used, it shall be shown or referenced on the diagram.

**5.2.2** Part 3B consists of a number which serves:

a) to identify the item without using either part 3A or part 3C of this block,

b) to distinguish between several items designated by the same letter in part 3A or 3C, and

c) to indicate whether the letter used is designating the kind of item ( letter followed by number ) or the function ( letter preceded by number ).

**5.2.2.1** Sequential numbers from 1 to n may be used. Groups of numbers may be assigned to groups of items.

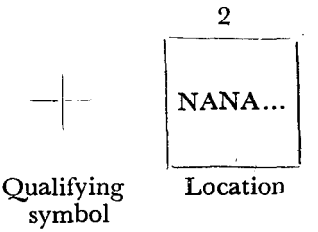
**5.2.2.2** An additional number, separated by a point ( . ), may be used to distinguish between similar parts of an item, which are shown separately on a drawing, for example, the contact units of a relay shown in detached representation.

**5.2.3** Part 3C gives information about the function of an item. When using this designation to describe the special function of an item in a circuit, the variety of functions prohibits the creation of a complete code.

**5.2.3.1** The designation may therefore be chosen arbitrarily, but it shall begin with a letter, which may be followed by additional letters and/or numbers if necessary. The coding shall be explained.

**5.2.3.2** Table 2 provides a list of letters for use where only general information about the function is sufficient (for example, main, auxiliary, etc).

**5.3 Location** — It is illustrated below:




**5.3.1** The location method permits rapid physical location of items in large, complicated equipment featuring multiple use of many identical, or closely similar items. Either of two methods of assigning numbers, sequential or coordinate, may be used at any equipment level, based on equipment configuration. These methods shall be applied in such a way

that duplicate complete item designations do not occur in a single equipment or system.

**5.3.2** A location designation generally consists of an alternation of letters and numbers which describe the coordinates ( for example, *see* Fig. 1 ). However, in certain cases, location designations consisting of numbers only may be used ( for example, *see* Fig. 2 ). In either case, the associated drawings will illustrate the code assignments ( for example, *see* Fig. 3 ). If other location systems are used, they shall be explained.

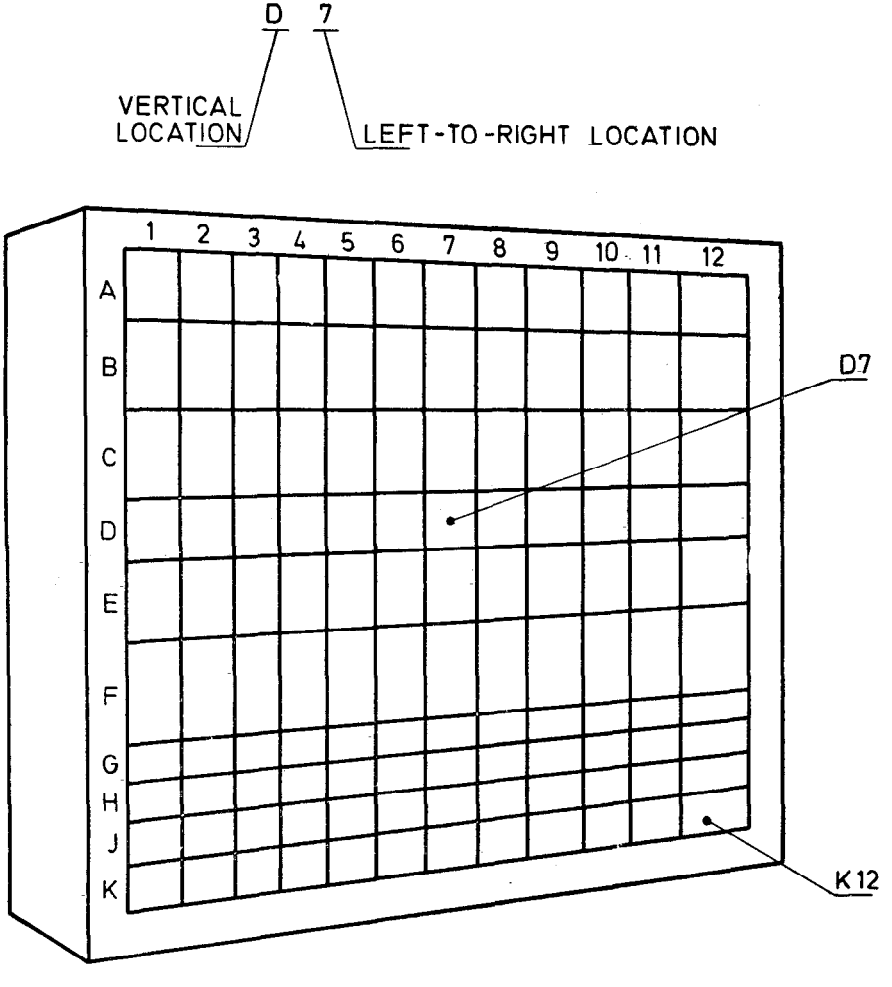



FIG. 1 ALPHA-NUMERIC LOCATION

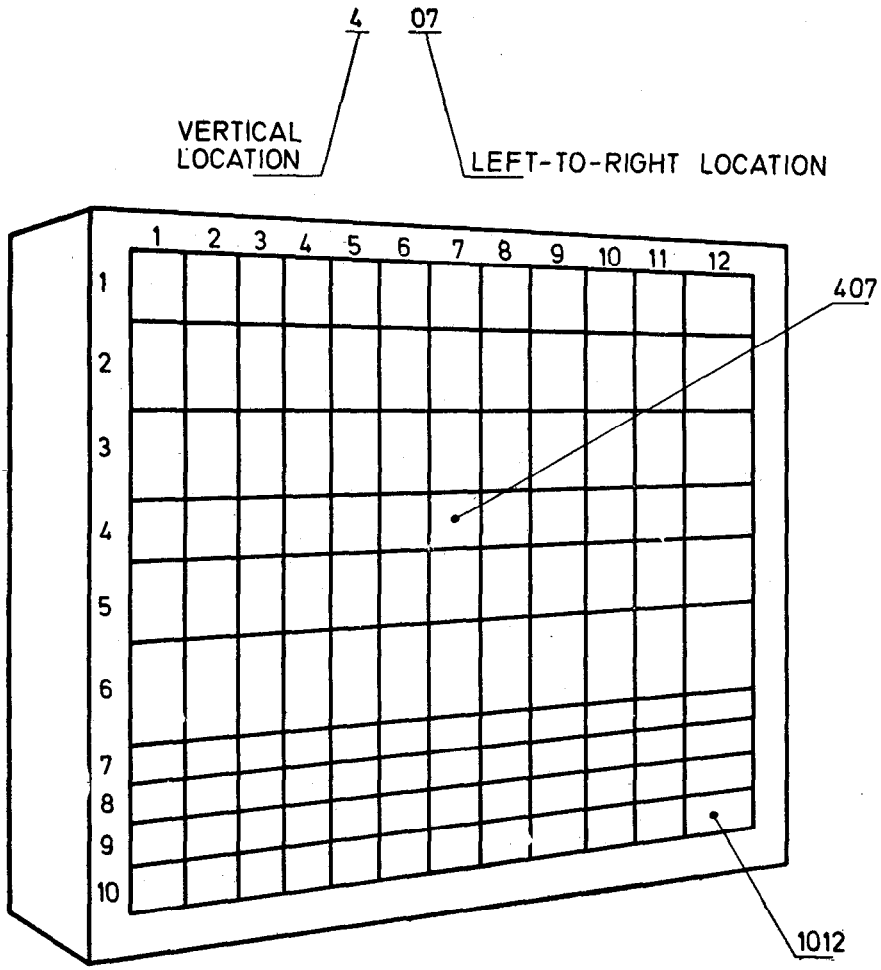



FIG. 2 NUMERIC LOCATION

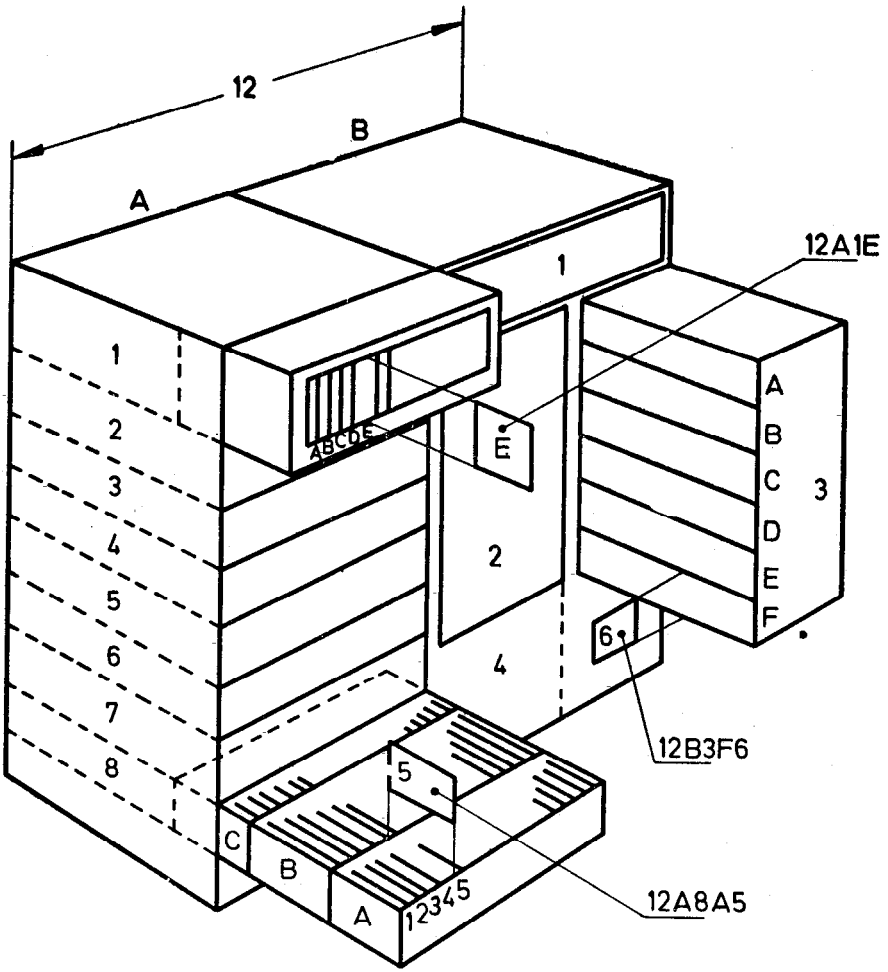
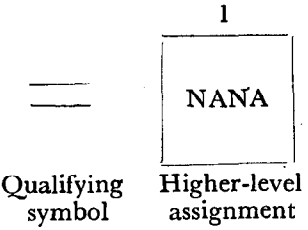



FIG. 3 EXAMPLE OF A LOCATION DESIGNATION CODE

**5.4 Higher-Level Assignment** — It is illustrated below:

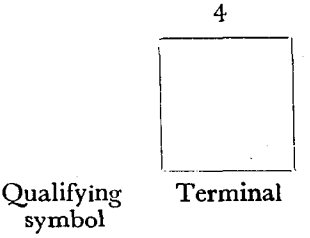



**5.4.1** Generally, each unit shall be assigned an identifying number, beginning with 1 and running consecutively. This number is the item designation of the unit. If there is only one unit, the unit number is omitted.

**5.4.2** Different unit numbers shall be used to identify identical or similar units of a system. However, item designations for assemblies and parts within these units shall be the same for corresponding items.

**5.4.3** If necessary, a unit location designation may be developed and used to prefix the unit number. The location designation required for any particular application depends on the equipment configuration.

**5.5 Terminals and Conductors** — It is illustrated below:

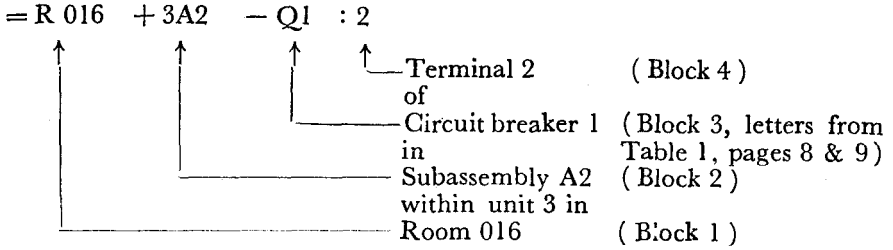



**5.5.1** Terminal designations shall correspond to the markings on the item. When terminal and conductor markings have been standardized in the relevent Indian Standard, those markings shall be used. When terminals and conductors are not marked and no Indian Standards for such marking exist, arbitrary designation should be assigned on the diagram. These designations are used, if necessary, as part of the complete item designation.

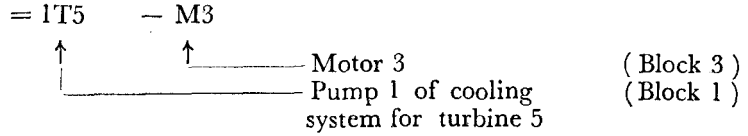
## 6. EXAMPLES

**6.1** Following are the examples of item designation:

a) Complete item designation in which the higher-level assignment is used to indicate the location of the item in the complete plant:




b) Item designation in which the higher-level assignment is used to indicate the purpose of the item in the complete plant:



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